Hole's Human Anatomy and Physiology

Twelfth Edition

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Chapter 10
Nervous System I: Basic Structure and Function

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10.1: Introduction

- Cell types in neural tissue:
  - Neurons
  - Neuroglial cells (also known as neuroglia, glia, and glial)

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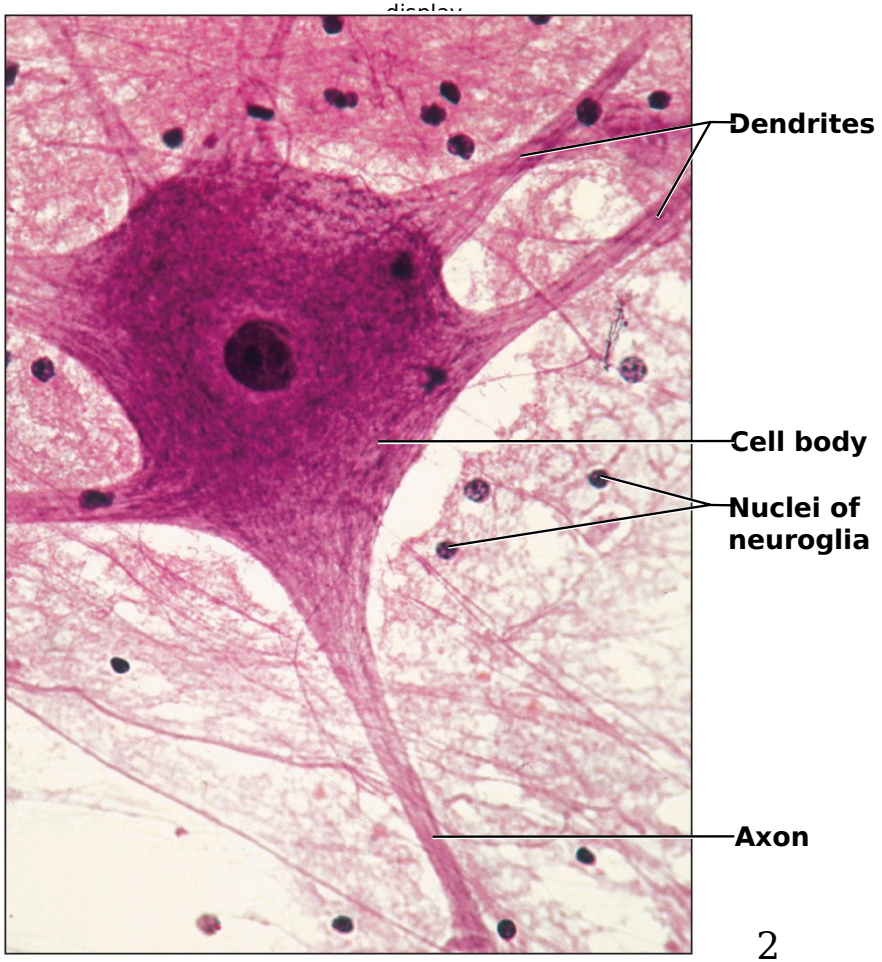

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Divisions of the Nervous System

- Central Nervous System (CNS)
  - Brain
  - Spinal cord
- Peripheral Nervous System (PNS)
  - Cranial nerves
  - Spinal nerves

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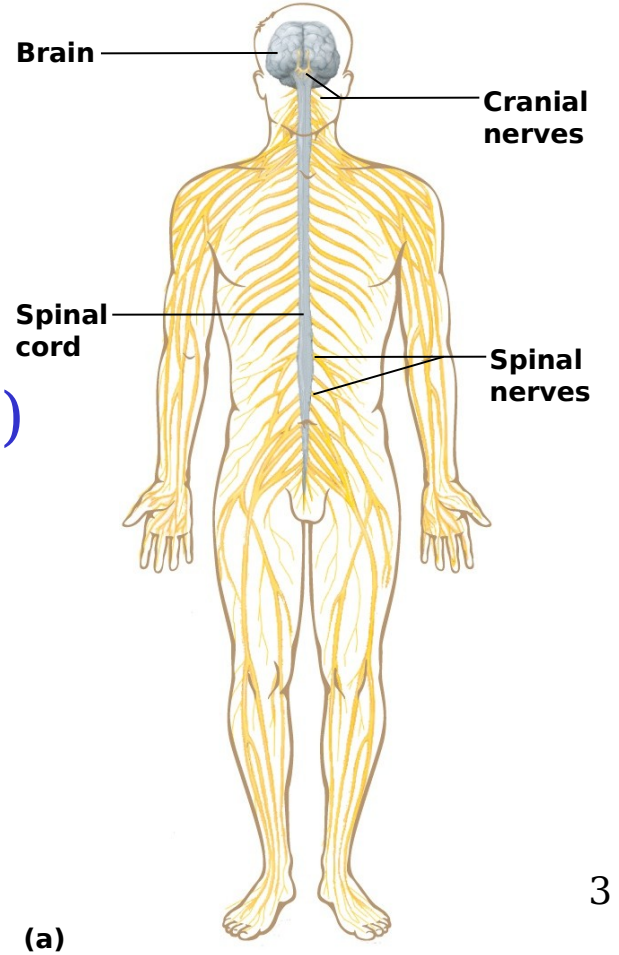

Divisions of Peripheral Nervous System

- Sensory Division
  - Picks up sensory information and delivers it to the CNS
- Motor Division
  - Carries information to muscles and glands
    - Divisions of the Motor Division:
      - Somatic – carries information to skeletal muscle
      - Autonomic – carries information to smooth muscle, cardiac muscle, and glands

Divisions Nervous System

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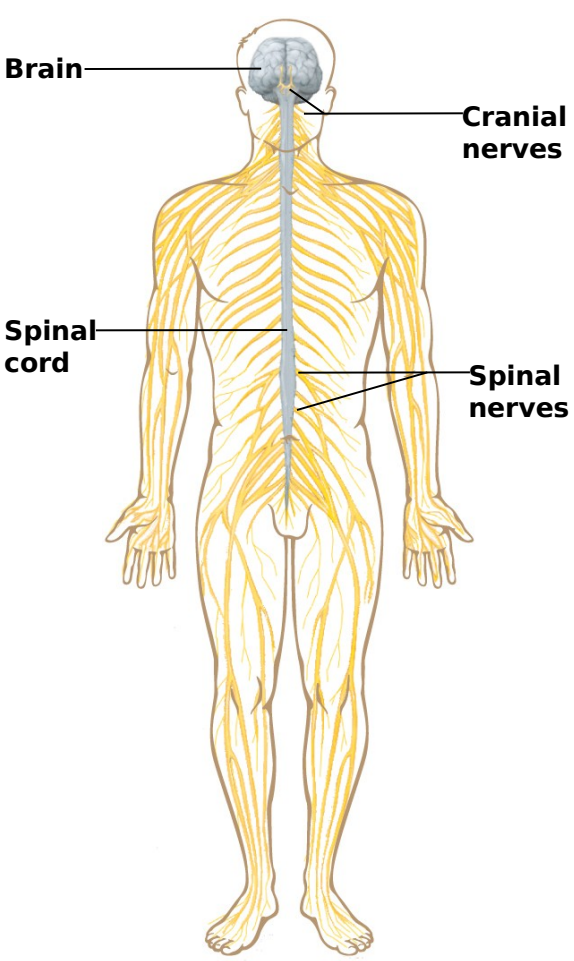

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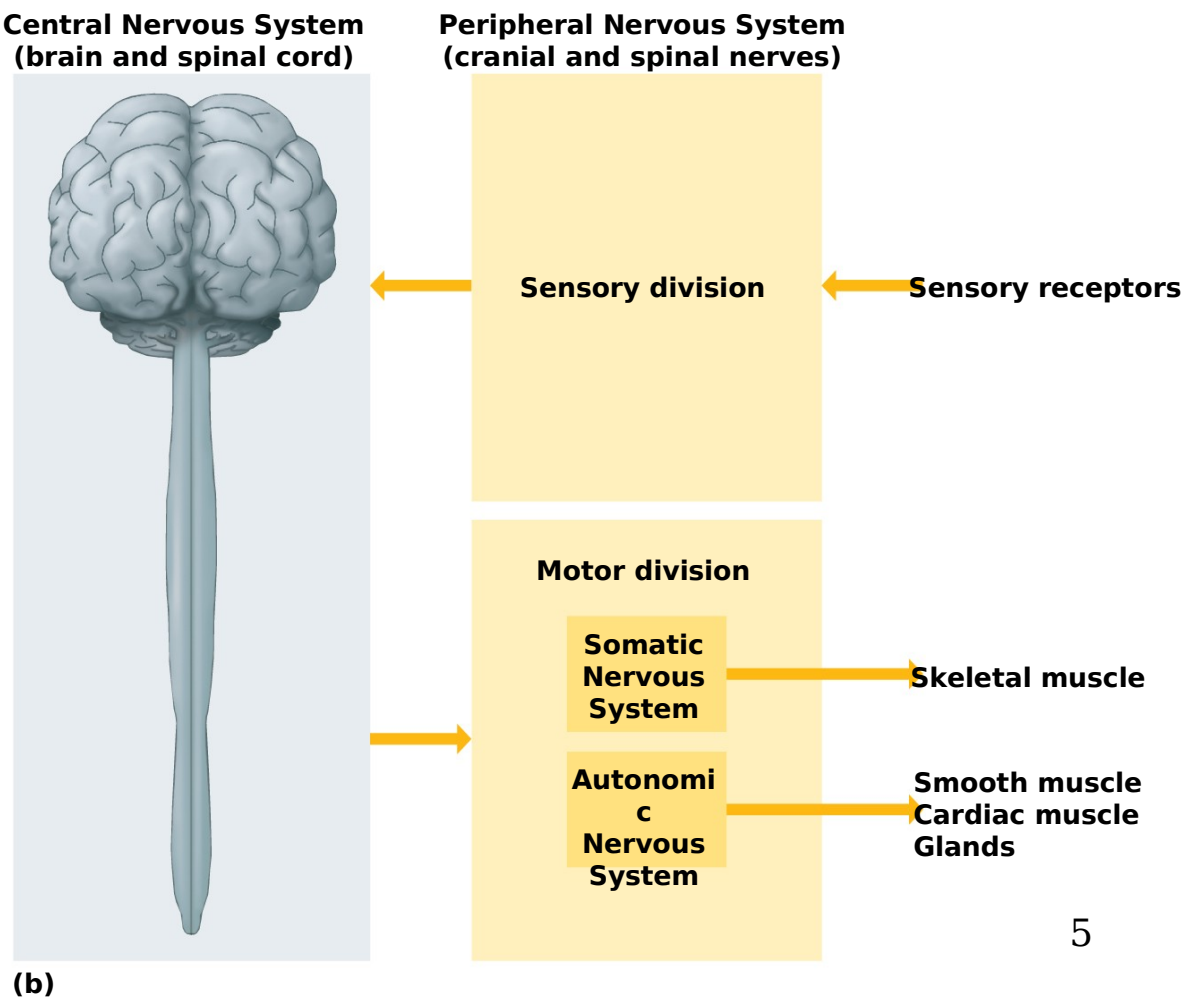

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10.2: General Functions of the Nervous System

- The three general functions of the nervous system:
  - Receiving stimuli = sensory function
  - Deciding about stimuli = integrative function
  - Reacting to stimuli = motor function

Functions of Nervous System

- Sensory Function
  - Sensory receptors gather information
  - Information is carried to the CNS
- Integrative Function
  - Sensory information used to create:
    - Sensations
    - Memory
    - Thoughts
    - Decisions
- Motor Function
  - Decisions are acted upon
  - Impulses are carried to effectors

10.3: Description of Cells of the Nervous System

- Neurons vary in size and shape
- They may differ in length and size of their axons and dendrites
- Neurons share certain features:
  - Dendrites
  - A cell body
  - An axon

Neuron Structure

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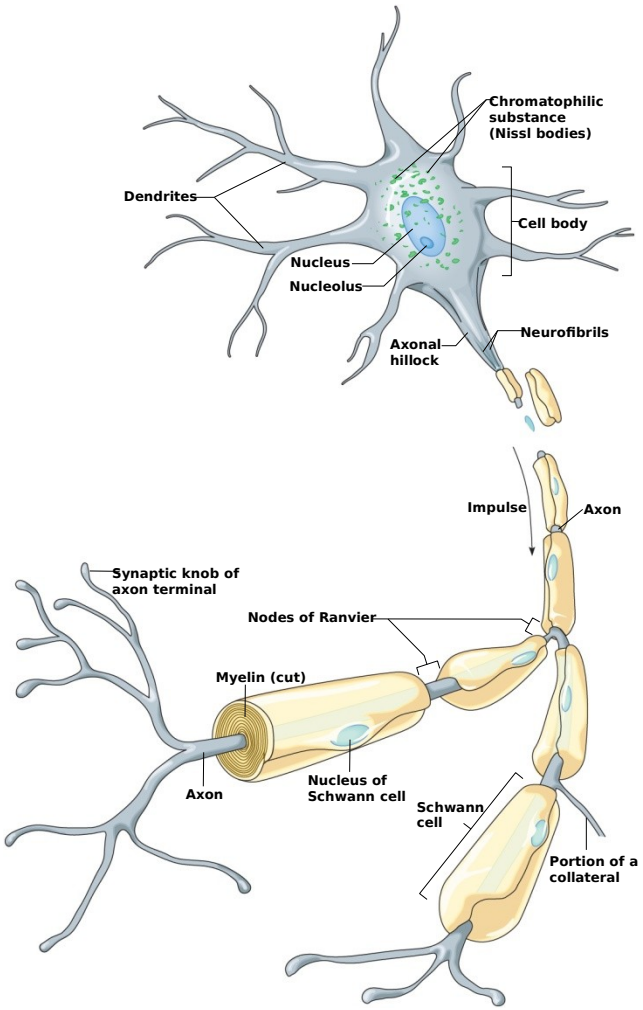

Myelination of Axons

- White Matter
  - Contains myelinated axons
  - Considered fiber tracts
- Gray Matter
  - Contains unmyelinated structures
  - Cell bodies, dendrites

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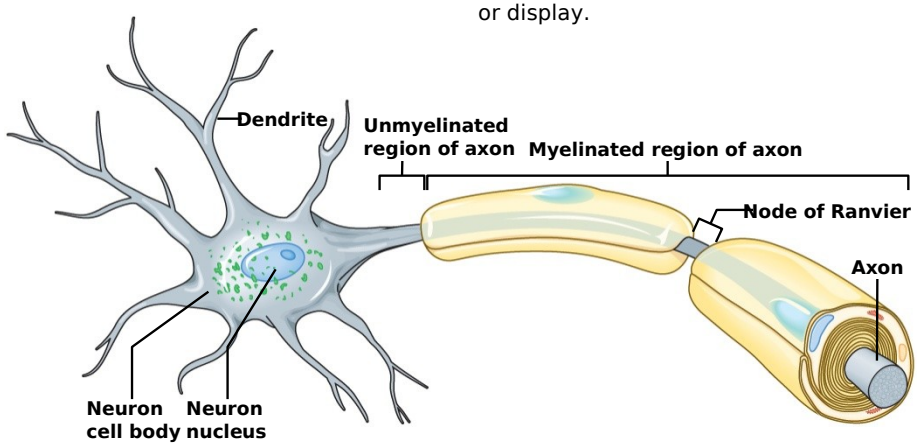

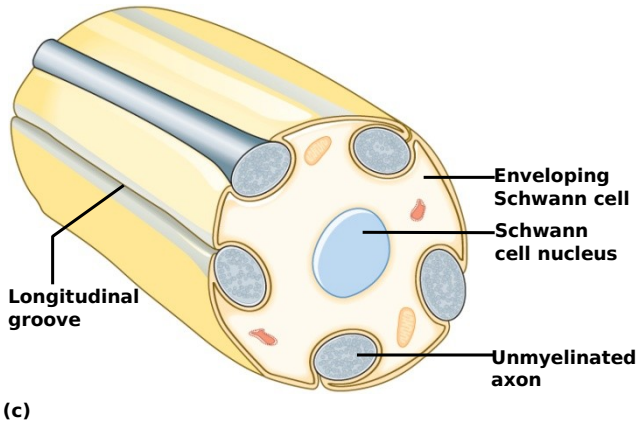

10.4: Classification of Neurons and Neuroglia

- Neurons vary in function
  - They can be sensory, motor, or integrative neurons
- Neurons vary in size and shape, and in the number of axons and dendrites that they may have
- Due to structural differences, neurons can be classified into three (3) major groups:
  - Bipolar neurons
  - Unipolar neurons

Classification of Neurons: Functional Differences

- Sensory Neurons
  - Afferent
  - Carry impulse to CNS
  - Most are unipolar
  - Some are bipolar
- Interneurons
  - Link neurons
  - Aka association neurons or internuncial neurons
  - Multipolar
  - Located in CNS
- Motor Neurons
  - Multipolar
  - Carry impulses away from CNS
  - Carry impulses to